

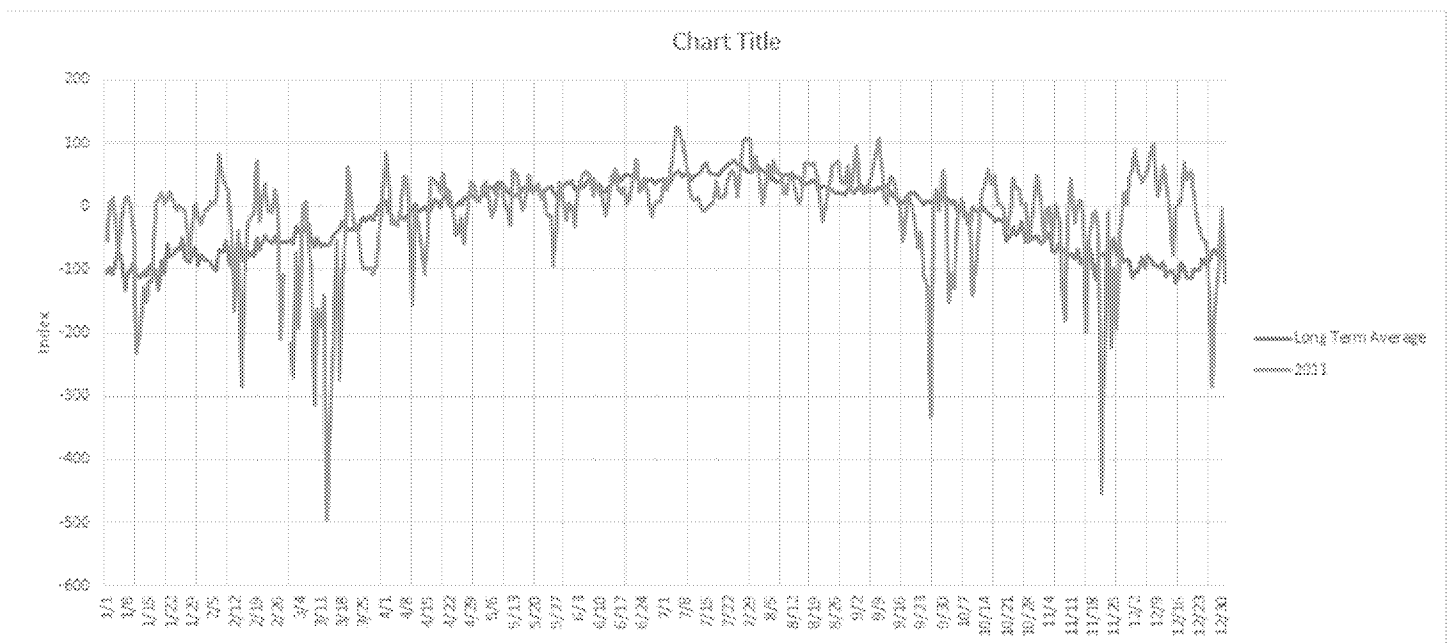
Message

From: Jacobson, Martin [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=8FAFEE20580B4AFAA071E71DDCC088EB-JACOBSON, M]
Sent: 3/8/2016 12:07:21 AM
To: Fullagar, Jill [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=7ba061353c314b40a14a8be1ee382ae3-Gable, Jill]; Labiosa, Rochelle [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=ded3654216c9461d95cd5a3ceec507ef-Labiosa, Rochelle]; Brown, Cheryl A. [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=dd6f8a562924439aaf97ca98ddaf1e10-Brown, Cheryl]; Cox, Michael [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=cddd6a5bb3c2477183799ef56cdb464f-Cox, Michael]; Cope, Ben [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=497efadd936e4d378225116b8f50fd3f-Cope, Ben]; Cora, Lori [/o=ExchangeLabs/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=c8850941bf1540c796559dce75c2f5ee-Cora, Lori]
Subject: RE: Upwelling index info RE: Deliberative Process / Ex. 5 Issue Paper
Attachments: Upwelling.xlsx

Hey Rochelle,

See the attached spreadsheet (includes daily data and the graph reproduced below). I just did a quick analysis comparing 2011 daily mean index values to the long term averages (1967 – Present). I could redo with 6 hour data if need be.

Marty



From: Fullagar, Jill
Sent: Monday, March 07, 2016 3:10 PM
To: Labiosa, Rochelle <labiosa.rochelle@epa.gov>; Brown, Cheryl A. <Brown.Cheryl@epa.gov>; Cox, Michael <Cox.Michael@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Jacobson, Martin <Jacobson.Martin@epa.gov>
Subject: RE: Upwelling index info RE: Oregon Listing: Issue Paper

Deliberative Process / Ex. 5

jill

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From: Labiosa, Rochelle
Sent: Monday, March 07, 2016 3:00 PM
To: Brown, Cheryl A. <Brown.Cheryl@epa.gov>; Fullagar, Jill <Fullagar.Jill@epa.gov>; Cox, Michael <Cox.Michael@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Jacobson, Martin <Jacobson.Martin@epa.gov>
Subject: RE: Upwelling index info RE: Deliberative Process / Ex. 5 Issue Paper

Thanks Cheryl –the result (ie 2011 in the middle of the pack) is very comparable to the NOAA index data from the offshore location- but they are slightly different data. The attached is windstress strength, which is a good proxy, but wind angle also matters (and the upwelling index is supposed to reflect both);

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I think the Bednarsek mooring data interpretation is helpful here, too.

I think we still need some context and citations on upwelling role on the coast, transects demonstrating the shoaling toward the shelfbreak and nearshore, and on 2d (lat/lon) spatial extent. I have added some initial thoughts and placeholders to our document, but I am still looking at the satellite imagery and compiling related citations. But you can see where I am going with it. Cheryl – there are a couple of questions for you in there.

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From: Brown, Cheryl A.
Sent: Monday, March 07, 2016 2:36 PM
To: Fullagar, Jill <Fullagar.Jill@epa.gov>; Labiosa, Rochelle <labiosa.rochelle@epa.gov>; Cox, Michael <Cox.Michael@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Jacobson, Martin <Jacobson.Martin@epa.gov>
Subject: RE: Upwelling index info RE: Oregon Listing: Issue Paper
Importance: High

I forgot about this Oregon upwelling index. It is used very often in Oregon shelf papers. Using it you can compare upwelling strength for different years:

<http://damp.coas.oregonstate.edu/windstress/>

This figure shows that 2011 is not anomalous. Might be able to just use this.

<http://damp.coas.oregonstate.edu/windstress/allyears.html>

I have the Harris paper (referenced in Rochelle's email) if anyone wants that one. I didn't include it in the citations because they only measure pCO₂, so aragonite saturation state isn't calculated.

Cheers,
Cheryl

From: Fullagar, Jill
Sent: Monday, March 07, 2016 2:22 PM
To: Labiosa, Rochelle <labiosa.rochelle@epa.gov>; Brown, Cheryl A. <Brown.Cheryl@epa.gov>; Cox, Michael <Cox.Michael@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>; Jacobson, Martin <Jacobson.Martin@epa.gov>
Subject: RE: Upwelling index info RE: Oregon Listing: Issue Paper

Thanks Rochelle.
Marty—is this something you could help us with? Thanks.

jill

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From: Labiosa, Rochelle
Sent: Thursday, March 03, 2016 10:23 AM
To: Brown, Cheryl A. <Brown.Cheryl@epa.gov>; Cox, Michael <Cox.Michael@epa.gov>; Fullagar, Jill <Fullagar.Jill@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>
Subject: Upwelling index info RE: Oregon Listing: Issue Paper

Hi All,

Attached is the NOAA upwelling index info from station 45N/125W, which is off of Lincoln City, OR. The first sheet has all of the data, and some plots near the end that I made just playing around with it. Jill — I would like to check in to see if Marty has some capacity to run some time series stats in R on the whole dataset. I would love to do this, but it is a large dataset and I don't have time beyond what I have done here. I can help him figure out what to do though. Note that for plotting purposes I deleted the missing data so those cells are blank (just a handful out of the whole series, cells which were originally marked -9999).

For the second and third sheets, I merely pulled the August 2000-2014 (data go back to '67 just FYI), and plotted the month of August from 2000-2014 (see plot) and I increased the line thickness for 2011, the time period of the study-dark green line, and the line thickness for the mean of each daily average over 2000-2014 (thick yellow line). (I know it is a mean of means, but I believe each daily mean has the same amount of data typically – but I will make sure that the 6-hourly original data does not have a lot of missing data.)

Below is a link to PFEG data location – I downloaded daily from 45N 125W, which is a location off of Lincoln City, but there are other locations listed. I can pull in another site if needed, but this was the most central location for OR.

http://www.pfeg.noaa.gov/products/PFEL/modeled/indices/upwelling/NA/data_download.html

I also wanted to point you to this excerpt from the Bednarsek et al. paper, which is used to demonstrate that the 2011 upwelling/summer conditions were typical of the previous years (since 2007 based on data at Newport, OR and citations given)

The results for the 2011 cruise (figure 1a,c), which are representative of summertime conditions for the last few years, show evidence for corrosive water shoaling along the bottom to depths of about 20–50 m in the coastal waters off Washington, Oregon and northern California, and to depths of 60–120 m off southern California. The Washington–Oregon results are consistent with time-series measurements off Newport, Oregon, which provide evidence for increased fluctuations in Ω_{ar} (range: 0.8–3.8) on time-scales of weeks and very low saturation state waters during the upwelling season from June through to October [14,16]. From the moored saturation state and temperature observations from 2007 through to 2011, it is evident that the upwelling events primarily occur in the summer and early autumn months and last for approximately one to five weeks [14,16].

14=Harris KE, DeGrandpre MD, Hales B. 2013 Aragonite saturation state dynamics in a coastal upwelling zone. *Geophys. Res. Lett.* 40, 2720–2725. (doi:10.1002/grl.50460)CrossRefGeoRefWeb of Science

16= Evans W, Hales B, Strutton PG. 2011 Seasonal cycle of surface ocean pCO₂ on the Oregon shelf. *J. Geophys. Res.* 116, C05012. (doi:10.1029/2010JC006625)CrossRef

Next thing up – I will be looking further at the SST data – I looked at the 4km and it is not high enough resolution, so now I am looking at the 1km data. Will keep you posted.

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From: Brown, Cheryl A.

Sent: Tuesday, March 01, 2016 1:37 PM

To: Cox, Michael <Cox.Michael@epa.gov>; Fullagar, Jill <Fullagar.Jill@epa.gov>; Labiosa, Rochelle <labiosa.rochelle@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>

Subject: RE: Oregon Listing: Issue Paper

Looks like a great outline to me.

Here are some minor revisions.

Cheryl

From: Cox, Michael

Sent: Tuesday, March 01, 2016 11:29 AM

To: Fullagar, Jill <Fullagar.Jill@epa.gov>; Labiosa, Rochelle <labiosa.rochelle@epa.gov>; Cope, Ben <Cope.Ben@epa.gov>; Brown, Cheryl A. <Brown.Cheryl@epa.gov>; Cora, Lori <Cora.Lori@epa.gov>

Cc: Cox, Michael <Cox.Michael@epa.gov>

Subject: Deliberative Process / Ex. 5 Issue Paper

I took what I heard yesterday, incorporated Cheryl's input, and incorporated Ben's initial comments into an initial draft of an issue paper for the Oregon listing.

Prior to filling in the blanks, I wanted to make sure people were okay with the outline.

I was thinking this would be the briefing paper for OWW management.

The second page is just a to-do list for us.

Please get comments back to me and then we can discuss how to move forward.

Thanks.

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